KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF COMMUNITY HEALTH

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH INFORMATION

SYSTEM OF THE AFIGYA SEKYERE DISTRICT, GHANA

BY

ZACHARIAH SULEIMAN YEBOAH

NOVEMBER, 2008

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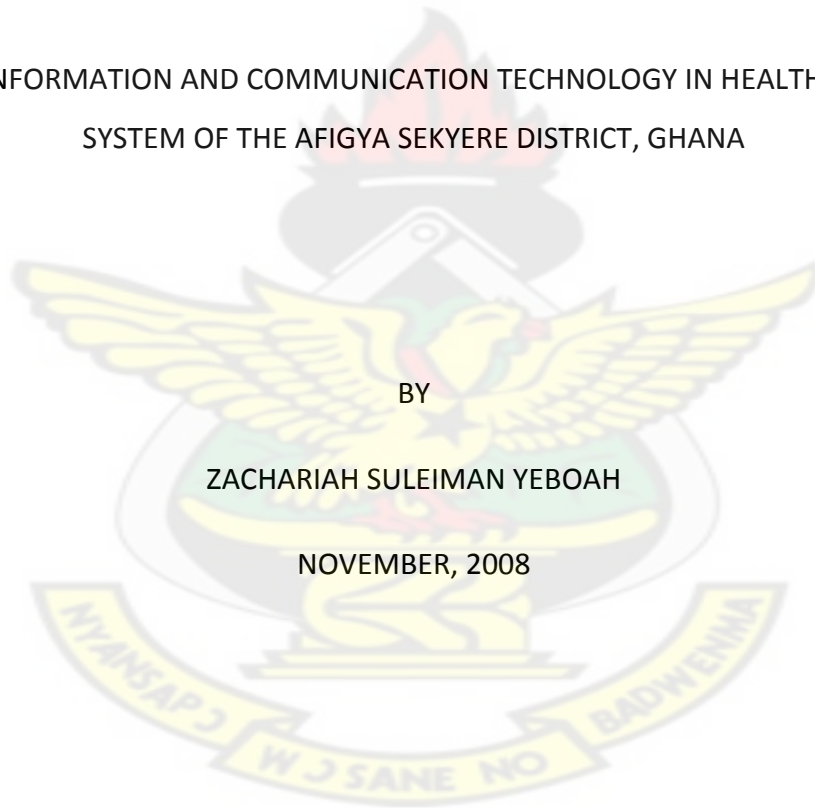SCHOOL OF MEDICAL SCIENCES

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THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH INFORMATION

SYSTEM OF THE AFIGYA SEKYERE DISTRICT, GHANA

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, KWAME NKRUMAH UNIVERSITY

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THE DEGREE OF MASTER OF SCIENCE IN HEALTH SERVICES PLANNING AND MANAGEMENT

BY

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KNUST

# DECLARATION

I hereby declare that this thesis was prepared and submitted by me. I therefore accept sole responsibility for any mistake and error in this thesis. I declare therefore that, this work has neither in whole nor in part been presented for degree elsewhere.

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(STUDENT)

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Signature                              Signature

DR. EASMON OTUPIRI                DR EASMON OTUPIRI

(Supervisor)                            (Head of Department)

# DEDICATION

This research work is dedicated to my beloved grandmother, Madam Salamatu Dufie.

# ACKNOWLEDGEMENTS

# DEFINITION OF TERMS

**ANALYSIS** - An examination of facts together with thoughts and judgments about it.

**DATA** - Facts of information.

**DISSEMINATION** - Movement of information from one place to the other.

**FEEDBACK-** Information about the results of a set of actions passed back to the person or machine in charge so that changes can be made if necessary.

**HEALTH INFORMATION SYSTEM** - It is a set of components and procedures Organized with objective of generating information which will improve health care management and decision making.

**INFORMATION** - Knowledge in the form of fact.

**INFORMATION AND COMMUNICATION TECHNOLOGY -**Is the computing and telecommunicating technologies that provide automatic means of handling information. Therefore it is taken to represent equipments both tangible hardware and intangible software.

**SYSTEM** - Collection of components that work together to achieve a common objective.

# LIST OF ABBREVIATIONS/ACCRONYMS

A'LEVEL          Advanced Level

ASD              Afigya Sekyere District

CBSV             Community Based Surveillance Volunteers

DCE              District Chief Executive

DHMT             District Health Management Team

GHS              Ghana Health Service

GCE              General Certificate in Education

HIS              Health Information System

ICT              Information Communication and Technology

IT               Information Technology

ITAA             Information Technology Association of America

MSLC             Middle School Living Certificate

MDG              Millennium Development Goal

MOH              Ministry of Health

NHIS             National Health Insurance Scheme

NGO              Non-Governmental Organization

O'LEVEL          Ordinary Level

SDHMT            Sub district Health Management Team

TBA              Traditional Birth Attendance

HIV              Human Immunodeficiency Virus

WHO              World Health Organization

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# ABSTRACT

Many developing countries including Ghana have made efforts to strengthen their health information system by using ICT. This is to ensure that the fragmented health information system is knit together to ensure effective planning and decision making. The drive for the reform of health information system has coincided with the ICT revolution. This study was to direct the attention of health managers to focus on the need to have an effective health information system by taking advantage of the ICT revolution. The study was also to identify how ICT can enhance health information system in the Afigya Sekyere district of Ghana.

The study design was descriptive cross-sectional which was employed to describe a situation at a particular point in time. Analysis was restricted to the information generated from the respondents. A self - administered questionnaire, a key informant interview schedule, and focused group discussion guide were used to solicit information from the respondents. The quantitative study involved 60 respondents, purposively selected within the health workers.

 The use of ICT in HIS was very minimal because 70.0% of the respondents do not use computers. The study revealed that 56.7% of the health workers still use manual methods of keeping health information. Majority of the workers agitated for the computerization of the health sector. By this most of the respondents preferred computers to the manual form of storing data. Nearly half (45.0%) of the health workers held middle school leaving certificate. It came out that 55.5% has difficulties accessing information. Lack of finance, untrained staff, infrastructure and expertise were noticed as challenges in the use of ICT in the health information system.

It was believed that the computerization of the health sector should be considered with all the seriousness it deserved, to promote an effective health care delivery system. It was recommended that the community and the district assembly should do more to ensure a good health care delivery by taking advantage of the ICT boom. Other stakeholders like the government and the NGOs were also recommended to help provide infrastructure like equipments and buildings to solve these challenges.

# CHAPTER ONE

## 1.0 Introduction

## 1.1 Background information

The issue of Information and Communication Technology (ICT) has become crucial in the post industrial era. ICT has been seen as a catalyst for the overall development of some countries in the world.

A key feature of globalization is ICT which has been defined by Heeks as the computing and telecommunicating technologies that provide automatic means of handling information. It is therefore taken to represent equipment both tangible hardware and intangible software (Heeks, 1998). One of the most significant impacts of the ongoing information revolution has been in the health sector. In the field of health care, ICT has emerged as the key instrument in solving many of the most pressing problems (Srivastava, 2007).

Recent experience by Braa and Hertzberg (2002) attests to the potential use of computers in health information systems.  As a result, many developing countries are attempting to deploy IT in various facets of governance, and health is a key focus area.

The developmental process of every country depends on its information cycle .So, like the other sectors, the health sector also gathers information which helps them to take decisions. Health Information System (HIS) is a set of components and procedures organized with the objective of generating information which will improve health care management and decision at all sectors or levels of the health system.

In effect the application of ICT in HIS would be a means by which quality health care delivery can be assured through reliable information which can be easily accessed, confidentially assured, quickly disseminated, instant feedback and effective storing of classified and non-classified health information. Establishment of wireless internets in the remote areas and other communication gargets will help enhance the health delivery system because electronic-health or the health telemetric sector is fast emerging as the third industrial pillar of the health sector after pharmaceuticals and medical [imaging] devices industries (Srivastava, 2007). HIS and ICT are indispensable tools which one cannot breakaway from the other if the health sector wants to take decisions which will have a positive impact on the citizenry.

The Ministry of Health (MOH) seeks to improve the health status of all people living in Ghana through the development and promotion of proactive policies for good health and longitivity, the provision of universal access to basic health services which are affordable and accessible, (GHS, 2005). These cannot be achieved if proper data are not kept through the use of ICT for the present and the future. The full implementation of this noble aim can only be achieved with the application of ICT in the health information system (HIS) throughout the country.

The development of the health sector needs a systematic application of ICT which will ensure quality health care. This cannot be disputed about because, according to Allotey, we paid the price of not taking part in the industrial revolution of the late eighteenth century because we did not have the opportunity to see what was going on in Europe. Now we see that information and communication technology has become an

indispensable tool. This time we should not miss out on this technological revolution (Allotey, 2005].

## 1.2 Problem statement

Health Information is a vital tool for the efficient and effective management of health services, deliveries and facilities. Health information should be available for proper planning and decision making to take place. Every single decision taken in the health sector must be based on reliable information received. Since the health sector is an information intensive sector (Yamuah, 2005), efforts must be made to ensure that, information flowing from every single area, flows without any constraints. However, evidence on the ground shows a bad picture about how some decisions are made without any information inputs. Sometimes the process of transmitting, compiling, analyzing and presenting data was so prolonged that they are often obsolete before they get to the people who need them. Evidence gathered also shows a minimal use of ICT in the health sector. For HIS to deliver the data it generated, it needed to be complete, accurate, consistent and timely (Brown et al 1999).

Afigya Sekyere district does not have the capacity to get the HIS which was accurate, timely complete and secured because the communication infrastructure was unable to support ICT projects and hence the minimal use of ICT in its HIS. These have resulted in problems such as; poor information flow, managers taking decision based on intuition, unreliable and inaccurate data, lack of storage and security and poor information feedback.

It became disturbing to realize all these problems going on in the health sector. Observation showed that current ICT operations of the health services throughout

the region was grossly inadequate. The recording procedures in most hospitals leave much to be desired. A manual recording system was the order of the day. This system was prone to enormous inaccuracy preventing the flow of information [African Development Foundation, 2000]. One wonders how those at the national level prepare policies to mitigate the problems at the district level. If this was the way HI was managed then it would be difficult to meet the targets of the Millennium Development Goals. That is why health services continue to grow and yet health problems and inadequacies persist throughout the country.

## 1. 3    Rationale of the study

The rationale of the study was to demonstrate how ICT can enhance health care delivery system in the Afigya Sekyere District and its constraints or challenges. In other words the study was to assess the mode of storing data, feedback, security of data, analysis of data and mode of accessing health information among other things in the Afigya Sekyere District of Ghana.

The study sought to demonstrate how the chunk of health information fails to reach the appropriate quarters for effective decision making. In effect this study would give an insight as to the effectiveness or ineffectiveness of HIS in the district. It will also demonstrate how ICT can enhance HIS in the district.

The rationale of the study was to direct the attention of health workers and managers to focus on the need to have an effective HIS by taking advantage the ICT revolution currently ruling the world. The study was also expected to demonstrate the importance of ICT in HIS at the end of the day.

## 1.4 Conceptual framework

ICT in HI was likely to overcome most problems confronting Health Information System in the country. The role that ICT plays in HIS was to enhance information flow, easy accessibility of health documents, data security, fast decision making and quick feedback. Successful implementation of ICT in HIS could be realized if staffs were trained, infrastructure like buildings and equipments were improved and adequate resources were made available to confront such an important idea of bringing ICT into HIS. With these noble ideas, health information system should be accessible, reliable, secure and analyzable in the district among other things.

**Figure 1 Conceptual framework**
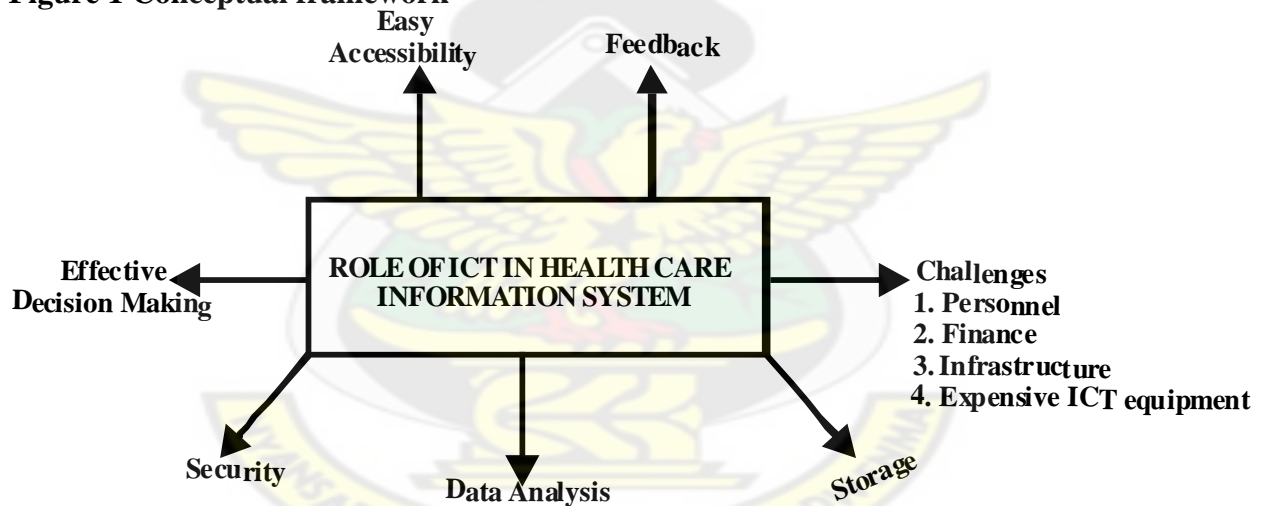


Source: Author's own construct, 2008.

## 1.5    Research questions

- How do the health staff store health Information?

- How do they access health information within and beyond the district?

- To what extent is feedback received?

- To what extent are health data secured?

- How do they analyse data?

- How do they think ICT could enhance HIS?

- To what extent would the challenges of ICT affect planning and decision making in the district?

- What information can be used to improve Health System Information in the district?

## 1.6 Study objectives

## 1.6.1 General objective

To identify how ICT can enhance health care information system in the Afigya Sekyere district of Ghana.

## 1.6.2 Specific Objectives

1. To identify the mode of storing health information (HI) in the district.

2. To describe the degree of difficulty in accessing health information.

3. To determine whether feedback is received.

4. To investigate the level of data security.

5. To determine whether data are analysed in the district.

6. To investigate how ICT can enhance HIS.

7. To assess the challenges of using ICT and how it affects planning and decision making

8. To make recommendations to the District Health Management Team on the need to improve health care by using ICT.

## 1.7 District profile

## 1.7.1 Background Information

Afigya Sekyere District is one of the 21 districts of the Ashanti Region. The district is located in the north – eastern part of the Ashanti Region. The district shares boundaries with four districts. In the south by Kwabre, north by Sekyere West, east by Sekyere East and west by Offinso districts respectively.

Agona the District Capital and also the seat of the District Administration are 27 kilometers from Kumasi on the Kumasi – Mampong trunk road. Agona also seats the shrine of the famous Okomfo Anokye (conjuror of the famous Ashanti Golden stool).

The predominant tribe is Ashanti, with other minors especially from northern Ghana.

The vegetation is partly forest and savannah. There are two forest reserves namely the Offin Forest Reserve and Gye Anoma Forest Reserve. The River Offin meanders across the length and breath of the district. Notably the district can boast of cocoa, timber and other crops like maize, cassava, plantain, oranges, and vegetables.

Unfortunately majority of the inhabitants are peasant farmers with very low income.

Some of the important tourist attractions in the district are

- ❖ The famous Okomfo Anokye shrine at Agona.

- ❖ The footprints of Okomfo Anokye on the trunk of a huge tree near Boamang.

There are kente weaving and craft carvings at Kona, Jamasi, Denase and Bepoase.

Some of the major endemic diseases are Malaria, HIV/AIDS, Buruli Ulcer, Yaws, Onchocerciasis, Schistosomiasis and intestinal worms.

Table 1 Distribution of Health Facilities

| Type | Health centre | Clinics | Maternity | Total |
|---|---|---|---|---|
| Government | • Agona<br>• Kona<br>• Jamasi<br>• Boamang<br>• Kyekyewere<br>• Ahenkro<br>• Boanim<br>• Tetrem<br>• Domeabra | Nil | Nil | **9** |
| Mission Hospital | S.D.A. Hosp. Asamang<br>S.D.A Hosp. Wiamoase | Salvation army, Wiamoasi<br>Sacred heart Bepoase | Nil | **4** |
| Private | Nil | Nil | Nil | |
| **Total** | **11** | **2** | **Nil** | 13 |

Source: Annual Report, Afigya-Sekyere District Health Administration 2007.

The District has a total of 13 health facilities

(1) Government Institutions – 9

(2) CHAG – 4

## 1.7.2 Population distribution

The district has a population of 150,498 as at the year 2007 and a total land area of 714 square kilometers. There are 91 towns and villages in the district. The District has been divided into 6 Sub-districts namely Agona, Kona, Jamasi, Boamang – Kwamang, Ahenkro (BKA), Wiamoase and Kyekyewere

## 1.7.3 Transport and communication

The general road network in the district was very poor. The only tarred road runs from Kona to Jamasi, which is part of the Kumasi-Mampong trunk road. All others are feeder roads making accessibility to the hinterland very difficult.  However the main Road from Ahenkro to Kyekyewere was now under construction. The bad nature of the roads will affect health delivery because information could be delayed before reaching a sub district health post since most roads may not be motorable. Lack of communication infrastructure could also affect the smooth introduction of ICT.

Table 2 Human Resource; staffing levels

| GHS | Number at post | Number of required additional |
|---|---|---|
| Doctor | 1 | 2 |
| Administrator | 0 | 1 |
| Medical Assistance | 6 | 3 |
| Pharmacist | 0 | 1 |
| Public health nurse | 2 | 2 |
| Midwifes | 11 | 9 |
| SRNS | 7(1 ON | 4 |
| E/Nurses | Transfer) | 2 |
| CHNS | (1 in school) | 9 |
|  | 1 |  |
|  | 16 |  |
| Disease control | 5 | 2 |
| Dispensing technicians | 3 | 2 |
| Accountants | 1 | 0 |
| Medical record | 1 | 1 |
| Assistant | 1 | 1 |
| Health assistants | 10 | 0 |
| Ward assistants | 10 | 0 |
| Orderlies | 4 | 0 |
| Typist | 40 | 0 |
| Store keeper | 3 | 0 |
| Driver | 1 | 1 |
| Security | 1 | 0 |
| Causal | 9 | 0 |
|  | 9 | 0 |
|  |  | 39 |
| Total | 142 |  |

Source: Annual Report, Afigya-Sekyere District Health Administration 2007

## 1.8 Analysis of human resource in the district

The district population stands at 150, 498 and from the table the district have only one medical doctor making a ratio of 1:150,498 which goes against what the GHS has set for a population. There was no health administrator and pharmacist in the district.

The statistic for the PH nurses, midwifes, SRNS, E/Nurses CHNS stood at 2, 11, 7, 1 and 16 respectively. The district could boost of only six (6) medical assistants out of 11 district hospitals.

They have 10 record assistants who keep health information data. According to the DHMT it was enough, however finding from the district showed that the district have 13 hospitals which mean there will be a shortage of 3 data recorders.

Orderlies formed the majority of workers of 40 out of total staff of 142. Their influence in HIS was very minimal since they do not record any data.

Again three typists in the district tell us the strength of computers in the district. There was only one driver for the district. Also 10 health assistants were recorded showing a deficit of 3 as the district has 13 hospitals and clinics

## 1.9 Scope of the study

The study was conducted in the Afigya-Sekyere located in the Ashanti region of Ghana. Respondents were only health facility workers within the district. This study measured the availability and non-availability of ICT in the district and the fastness within which information from the sub-district was disseminated to the district health directorate for decision to be taken.

## 1.10 Organization of the study

The research had been organized into six chapters.

Chapter one was made up of the background information of the research revealing knowledge gaps that exist as far as the role of ICT in HIS was concerned. It also looked at problem statement, rationale of the study, what the study sought to achieve and the district profile.

Chapter two looked at available literature on the mode of storing health data, how health information was accessed and disseminated and the confidentiality of health data. Other relevant literature reviewed were whether data was analysed, the timeliness of sending and receiving data and whether they get feedback, and the perception both positive and negative about the introduction of ICT in HIS and whether they think that ICT can enhance HIS. The review also looked at the challenges of ICT and how these challenges will affect planning and decision making.

Chapter three took care of the study design and methods, techniques and tools, and study variables. It also looked at population under study, the length and breadth of the study and pre-testing. This chapter again discussed ethical consideration that paved the way for data collection, tools for data analysis, some limitation of the study and again some assumptions.

Chapter four analysed the background characteristics of the respondents and some major findings of the study.

Chapter five discussed the results of the study linking the results with the research objectives and literature review.

Chapter six concluded by summarizing the key findings and outlined some recommendations based on what stakeholders could do.

# CHAPTER TWO

## 2.0 Literature review

The relevant literature on the subject under study  have been divided  under these sub-headings: mode of storing data, accessibility of information, feedback of information, security and analysis of data,  how ICT can enhance his, challenges of ICT and its effect on planning and decision making in the district.

## 2.1 Modes of Storing Data

The globalization era demands that data should be stored digitally and its retrieval should be easy wherever you may find yourself. It looks as if globalization has not caught up with some parts of the world and ASD was not an exception.

A study conducted in South Africa to evaluate their health information system revealed that, there was evidence to show that most South Africans still store health information manually (Garrib et al 2007). In his view, Glibber in 2006 said that data collection and communication are too often based on traditional methods (paper based), suffering from slow circulation to those who need them.

However the Ministry of Health in Ghana has a policy that provides for the basic framework for the information and communications strategy for the sub-district management, and the DHMT of the health sector within which detailed strategic plans for the deployment of information and communication infrastructure and systems will be developed. In particular the following specific health information and communication systems:

·Medical record system focusing on district and regional hospitals

·Budget and planning systems focusing on district, regional and national health administration

-Storage of information in a systematic way that will allow for easy retrieval (International institute for communication and development, 2003).

The manual format has manifested itself in Cambodia as a study came out clearly to show the cumbersome nature their health information goes through before processing. Use of technology for the NHIS was still limited. No computers were available at health centers and no plans existed currently since the majority of health centers do not have electricity. At the health center, the chief of health center manually collects data from all registers (Out-patient consultations, in-patient discharge for form district hospital, antenatal and post-natal cares, birth spacing, birth delivery, vaccination, vitamin A program, deworming activities, dental activities, leprosy, and lab results for malaria), and compile a paper form for monthly report then sends it to the operational district office (Veasnakiry and Sovanratnak, 2007).

Available literature also confirms that some health data are stored digitally. In a research which was first presented to the Royal New Zealand College of General Practitioners annual conference in Rotorua by Hunter, 2003 of Massey University on patient's attitudes to electronic medical records, it was confirmed that 80% of respondents were aware of somewhere that stored personal health information (PHI) on a computer, the majority of the respondents were unaware of the majority of places/agencies that store personal health information on computer (Hunter, 2003). In another WHO's assessment of Belizean on their health information it was confirmed that Belize had gone digital, they now have a system that allows data to be made available to authorized users

anywhere in the country almost as soon as they are entered in the system. Benefits include the use of alerts and reminders to decision-makers connected to the system, a greater ability to track and monitor infectious disease outbreaks, and country-wide support for such programmes as the prevention of mother-to-child transmission of HIV (WHO, 2009)

The use of ICT can allow data, documents, still and moving images and sound to be stored digitally, and to be accessed instantly regardless of where they are physically stored (Lippeveld, et al 1997). The use of ICT in storing health information can save time and improve upon the way of storing data. Notwithstanding all these there has been a dramatic increase in the use of ICT in Africa because other studies  have confirm that the rapid expansion of mobile telephony in Africa has opened new opportunities for using ICTs to deliver health care. In an article by Pooley on the topic Canadian health-care providers are spending millions on electronic health records also revealed that across the country, health regions and hospitals such as Sunnybrook are pumping billions of dollars into technology, upgrading their antiquated paper-based health records systems into flashy new electronic health records. Instead of lengthy delays waiting for a paper chart or X-ray film from the radiology department, orders and results can be viewed online, digital images accessed electronically and medication histories made available with a few simple clicks. By 2009, Canada Health Info way predicts that whether you're in a hospital in Charlottetown or a doctor's office in Vancouver, 50% of Canadians (through their physician) will be able to access their own electronic health records, everything from immunizations and drug histories to allergies and digital X-rays. The goal, of course, was simple: if doctors can access health records instantaneously and make more informed decisions about diagnoses, it will save time,

money and, most importantly, lives. The process of getting there, however, is anything but simple ( Pooley, 2006).

Digitizing the health sector was based on ability to make use of ICT this have been confirmed in an article by Gumisai Mutume on the topic Africa takes on the digital divide which revealed that, Africa has the fewest telephone lines, radios, television sets, computers and Internet users of any part of the world. These tools, used to package and transmit information and knowledge, are broadly referred to as information and communications technologies (ICTs). The gap between those with access to ICTs and those without was generally referred to as the "digital divide." It was most extreme in Africa, where in 2001, out of 800 million people, only 1 in 4 had a radio, 1 in 13 a television set, 1 in 40 a telephone and 1 out of 130 a computer. The divide widens in Africa's countryside, where lack of roads, telephone lines and electricity separates the rural majority from their urban counterparts (Mutume, 2003)

## 2.2 Accessibility of health information

In a key paper produced as part of a global review on access to health information, Godlee et al (2004) concluded that 'Universal access to information for health professionals is a prerequisite for meeting the Millennium Development Goals and achieving Health for All.' He went on to say that, 'Despite the promises of the information revolution, and some successful initiatives, there was little if any evidence that the majority of health professionals in the developing world are any better informed than they were 10 years ago. Lack of access to information remains a major barrier to knowledge-based health care in developing countries' (as well as in many parts of the developed world) (Godlee, et al., 2004). In Bangladesh, a project with a different level of

scale was developed to register, schedule and track immunization of children. Based in the city of Rajashahi, a computerized system was introduced to replace a manual record keeping system. Over a period of three years, the new system was able to increase immunization rates from around 40% to over 80%. A critical element of the success of this intervention was that it was designed to meet the interests and needs and provide tangible benefits to a number of different stakeholders. It reduced the time health workers spent searching records; it made it easier for managerial staff to supervise the immunization system and monitor performance; it improved immunization protection for children and ultimately their health, a positive benefit for the families reached by the system (Ahmed, 2004). Studies in Zambia on how Zambian health workers access health information showed that access to health information was very poor (Health Information and Libraries Journal, 2007). Efforts should also be made to seek mechanisms that combine new technologies with more traditional ones to. The health sector is an information intensive sector, so information accessibility should be very easy as it was done in the University of Kansas medical school. The university has used technological strategies to educate public health workers about human and animal health information. Through this project health workers have at their disposal timely and reliable health information (Teresa and Gayle, 2007). With cooperation, appropriate use of technology, and financial and political commitment, access to relevant, reliable information for healthcare workers can be improved in developing and transitional countries. Lack of access to basic information should not be allowed to continue to harm the professional development of healthcare workers and, moreover, the health of their patients (British Medical Journal, 2000). Shane (1997), looked at improving reproductive health in developing countries and estimated that 50 million induce abortions are performed each

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year, with some 20 million of these performed in unsafe circumstances or by untrained providers. All these are as a result of lack of access to a range of contraceptives choices as well as high quality information and services (Shane, 1997). A World Bank report estimates that 100000 deaths could have been avoided each year if reproductive health information like family planning were accessible to women who said they wanted no more children were able to prevent future pregnancies (World Bank, 1993). Beneficiaries can also be viewed through the prism of location and access, with an urban/rural differential. It was significant to see the way ICTs can enable the extension of access to health care from the urban to rural areas, helping to connect people to advice and information. This includes people being able to access their own health care information, and health care workers who are in the more remote settings being able to link with colleagues who have access to better facilities and information sources to get advice and support. According to the United Nations Development Programme: "There are more [internet] hosts in New York than in continental Africa; more hosts in Finland than in Latin America and the Caribbean; and notwithstanding the remarkable progress in the application of [information and communication technologies] in India, many of its villages still lack a working telephone which make dissemination difficult"(British Medical Journal, 2000). Also in 1999 there was a policy direction initiated by the government of Ghana that required every sub-district, and districts health management teams to have some ICT which would ensure proper access of data within the district (International institute for communication and development, 2003)

**Table 3 Connectivity Access 2004**

| Countries | Main Telephone Lines per 100 Persons | Personal Computers per 100 Persons | Internet Users per 100 Persons | Internet Hosts per 10,000 Persons |
|-----------|------|------|------|------|
| WORLD | 19.0 | 12.9 | 13.6 | 422.2 |
| Africa | 3.1 | 1.7 | 2.6 | 4.9 |
| Americas | 33.9 | 34.5 | 30.9 | 2347.6 |
| Asia | 14.3 | 6.35 | 8.1 | 74.3 |
| Europe | 40.9 | 28.5 | 31.1 | 362.6 |
| Oceania | 43.4 | 50.7 | 47.9 | 1408.3 |

Dependable connectivity was needed for reliable transactions. In developing countries fast connectivity was still limited and usually only dial-up access was available. Poor telecommunications infrastructure, limited number of Internet Service Providers (ISP), lack of access to international bandwidth, and affordable Internet access costs continue to be barriers to widespread use of ICTs. National expenditures among countries, even for countries of comparable income level, vary considerably (Casas, 2001).

A WHO monitoring and evaluation of maternal and newborn health and services at the district level also confirmed that, the rapid advances in information and communication technology (ICT) facilitate timely access to relevant maternal and new health-related information within the context of evidence based standards, programmatic guidelines and monitoring and evaluation approaches, methods and tools (WHO, 2006).

## 2.3 Feedback of Information

Feedback may be defined as a flow of information back from one stage in a cycle or process or system to a preceding stage, as a basis for further development. HIS is expected to follow a three – tier system. Community-based volunteers submit data and returns to the sub district. Then the sub districts feedback was a process of responding to information received from the sender in the case of the health services and health personnel at all levels of their process (MOH, 2000).

Feedback can also help provide information on the way a person was working and how well that worker was doing as well as the way to improve upon it. It also tells workers at all levels within the organization their analysis of the information received. Feedback also helps both the individual and the team in meaningful decision making thus, improving quality of care and increasing coverage (MOH, 2000).

The sustainability and effective utilization of this can only be successful through the use of ICT. Data collectors do not receive any feedback from the higher authorities on the relevance of the data collected and the need to improve upon the quality and timeliness of the data collection. They therefore attach no importance and seriousness to their data collection since they consider it as routine (MOH, 1995).

A framework paper by Dubow (2006), on improving health, connecting people: the role of ICTs in the health sector of developing countries supported that all participants must

get out of an information system at least as much as they put in it must generate benefits greater than its own cost, otherwise the system becomes a burden. Information systems are almost totally dependent upon the staff that provide and record the information, yet these are usually the lowest valued and least involved. If there are no benefits evident to them for the contributions they make, there is a high probability of building inaccuracy, instability, and future failure (Dubow, 2006).

The success of any information system was heavily dependent on feedback on data collected, which ideally, provide incentive for providing accurate up to date data and (Santa ,1998), explained further that it was extremely important to spend time and energy on the feedback process, interpreting data, summarizing to those who provide and collect it, particularly at the community level. However in another study in rural South Africa that evaluated their health information system confirmed that feedback were not sent and even those who submit returns do not know how their districts were performing,(Garrib, et al., 2008). Usually, collecting information and sending feedback by writing, sending back to the source through transport and other means become a problem. So the surest way is to make use of ICT so that feedback becomes as easy as clicking the button and the source get its feedback. Unfortunately, HMIS in most developing countries are poorly functioning due to a series of issues, such as irrelevance and poor quality data collected; centralization of information without feedback to lower levels; (WHO, 2007)

These senders need feedback as it has been echoed by (Khokar, 1992), that adequate feedback to the communities or lower levels must be effective, relevant, responsive and efficient. He went on to state that, administrative record system at the national level serves as national information health data with little feedback to

the local users. This implies that there should be a national ICT program which will ensure that feedback flow to and fro the sender and the receiver as (Lucey, 1997) asserted that health data providers become satisfied when they realized that their data were used to solve problems or initiate health projects.

## 2.4 Security of health information

Most health informations are very confidential because it tells something about the individual, community and the nation. Data collected from individuals in particular should be stored in a secured place, since it contains certain vital information from that individual. The current situation of paper documentation makes consumers and policy makers share concern about the privacy and confidentiality of health data National Academies Press, (2001). The security of data in Ghana was not secured. The situation in America was not different because a study conducted in America revealed that the United States still lacks national standards for the protection of health data. In another study to assess the national health information system in developing countries WHO emphasized that at the same time, this also means securing and protecting the information assets of the system. For example, a system may contain disaggregated patient information affected by privacy and security considerations. It was therefore essential to control access to confidential information (WHO, 2008). Another study conducted by Hunter, 2003 of Massey University on patients' attitudes to electronic medical records also confirmed that though some patients do not have any firm idea of any security measures that were used to protect electronic personal health information from being accessed by just anyone and they commented that no system was foolproof. Several patients stated that they had no idea but that they put their trust in the health care professionals to ensure good security measures (Hunter, 2003). Given the sensitive nature of health care

information, and the high degree of dependence of health professionals on trustworthy records, the issues of reliability (data residing in the electronic health record are accurate and remains accurate), security (owner and users of the electronic health record can control data transmission and storage), and privacy (subject of data can control their use and dissemination) are of particular significance and must be clearly and effectively addressed by health and health-related organizations and professionals (Ramsaroop, et al. 2003).

A comprehensive review and reference source on personal data protection regulation was published by the Pan American Health Organization, reliability, security, and privacy are accomplished by the implementation of a number of preventive and protective policies, tools, and actions that address the areas of physical protection, data integrity, access to information resources, and protection against unauthorized disclosure of information (Rodriguez, et al. 2001).

## 2.5 Analysis of Data

Data analysis was the transformation of raw data into useful information. Unanalyzed data would be difficult to understand. According to Darko data must be summarized and partly analyzed at the facility, district, regional before reaching the GHS. Data could be analyzed and presented as numbers of rates and proportions, (Darko, et al 1996). The most important part of analysis was to estimate coverage for services offered. However studies that evaluated the South African health information system showed that most health facilities send data in their raw form in South Africa (Garrib, et al 2008). It was the view of Savigny and Binka who Monitored the future impact on malaria burden in sub-Saharan Africa also expressed that

although data are the raw materials of the national HIS, they have little intrinsic value in themselves. Only after data have been compiled, managed and analysed do they produce information. Information was of far greater value, especially when it was integrated with other information and evaluated in terms of the issues confronting the health system. At this stage, information becomes evidence that can be used by decision-makers (Savigny and Binka, 2004). For instance, proportion of children under one who have completed the immunization scheduled or percentage of women who delivered without attending antenatal clinic. The coverage of each service could be as:

$$Coverage = \frac{No\ of\ reported\ cases \times 100}{Total\ target\ population}$$

The number of coverage fraction was the sum of all cases in a given period. For instance, the number of new antenatal visits over the total number of TT1 or TT2 given. This figure can simply be obtained from routine statistics. The denominator of the coverage fraction was more difficult to calculate. Many health facilities lack information as size of the target population in the catchment area and therefore cannot calculate their coverage. District Health Information Software (DHIS), designed for being used at district levels as a health data analysis tool (Braa and Herzberg 2002). The monitoring and evaluation experience in Bangladesh brings up major challenges encountered in this area: unidirectional data flows; poor supervision and management, analysis and feedback, resulting in low quality of routine MIS data.

There should be the application of ICT to help health workers analyze data before sending them. The analysis of data will help provide evidence to move health professionals and administrators from opinion base decision-making to evidence-based decision-making (Robinson ,2006).

It was very important to analyze data at each level of care that was geared towards their own specific needs (MOH – Uganda 1996). This will prevent the system where the center of health statistics will receive the bulk of data which makes analysis cumbersome.

## 2.6 Importance of ICT to the health worker

Studies done in India and Pakistan indicated that they have advanced in using ICT to improve data storage, treatment and collaboration among physicians, (Mujahid, 2002).

The importance of ICT has made WHO to enjoin all member countries to strengthen their access to health information through an improved system by managing information and making it available to the people who need them, the health sector has always relied on technologies. According to WHO (2004), ICT form the backbone of the services to prevent, diagnose and treat illness and disease. ICTs are only one category of the vast array of technologies that may be of use. Nevertheless, the role of ICT in modernizing the Health Sector is undeniable (WHO, 2004).

The role of ICT in health has been summed up in the Alma- Ata declaration in 1978. It was an acknowledged fact that Information and Communication Technology can provide a direct benefit to health primarily by increasing access to medical and health care: Primary health care was essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible and at a cost that the community and the country can afford to maintain (International institute for communication and development, 2003).

Xavier also echoed that, there was no doubt that ICT represent an opportunity for health (Xavier, 2006 ). Several studies have also confirmed the immense contribution of ICT to HIS integrating the use of ICTs into existing health systems has helped to improve the delivery of health care in a number of ways (Rodriguez, 2000a, 2000b; Pan American Health Organization, 2001). These include:

• The use of telemedicine to improve diagnosis and enhance patient care

• Improvements in the continuing professional development of health workers and better sharing of research findings

• Efforts to extend the reach and coverage of health care to make an impact on specific conditions.

Many of these given the right policies, organization, resources and institutions, ICTs can be powerful tools in the hands of those working to improve health (Daly, 2003).

The contribution of ICT to the development of quality health care cannot be underestimated because it plays a major role by ensuring that it eliminates loss of case files, effective communication between medical personnel, reduces storage space to the barest minimum, easier transmission of data from the point of generation to policy makers, rapid transmission of data from source of generation to health policy makers (Makinde , 2008). Despite these advantages some people still see ICT as not being important and a threat to their work.

.The importance of ICT also came out clearly in a study done by Ahmed, in Bangladesh on different level of scale was developed to register, schedule and track immunization of children a computerized system was introduced to replace a manual record keeping system .Over a period of three years, the new system was able to increase immunization rates from around 40% to over 80%. A critical element of the success of this intervention

was that it was designed to meet the interests and needs and provide tangible benefits to a number of different stakeholders .It reduced the time health workers spent searching records; it made it easier for managerial staff to supervise the immunization system and monitor performance; it improved immunization protection for children and ultimately their health, a positive benefit for the families reached by the system. (Ahmed, 2004) However, Wilson (2000) gives a warning that, "it was important to ensure that; computerization of health information systems does not dominate the health information system reform improvement process" (Wilson, 2000). This was because the majority of health information users in developing countries have no access to computer technology, thus the development and improvement of manual systems for collection, analysis, and use of data should be the primary focus. In support Lippeveld said that introducing ICT into the health sectors was not necessary the silver bullet that create effectiveness and efficiency in health service because lack of appropriate trained staff and hardware and soft ware problems sometimes result in the decay of obsolesce of expensive computer equipment, without gains in decision making (Lippeveld, 2001). Also the fear of change itself was naturally not exclusively related to changes initiated by ICT. The uncertainty inherent in any change makes many employees feel uncomfortable. The amount of information regarding aims and purposes joined with the introduction of ICT implementations was an important factor in this connection. The more relevance information the less risk of uncertainty among employees (Danish Technological Institute, 1997). The fear that there could be dismissal or changes within the organization would let some workers have a dislike for the introduction of new things and therefore will see it as not important.

## 2.7 Challenges of ICT and its Effect on Planning and Decision Making in the District.

The current globalization process has been hailed by many governments as the best way of good health care in their countries. Though it was a very good tool to ensure timely access of health information, it was being thwarted by a number of problems. Most health facilities do not have the human, material and financial resources to go in ICT projects. Most often projects may start for a very short period but it will not be sustained because of the problems enumerated above.

These problems go a long way to affect the quality of data and decisions taken at the national level. Allotey, et al (2000) have stated that there was a little transformation to support decision making because data collected are poor, due to the fact that the health sector was unable to train staff in the areas of ICT.

### 2.7.1 Untrained Staff

One of the biggest problem with the health sector was the slow pace of upgrading existing knowledge of it workers. Those who have computers most a time solicit the help of outsiders for small maintenance. Sandford (1992), asserted that the current HIS may not be the silver bullet that solves the problems at the health sector because the computerized systems are bedeviled by the lack of appropriate trained staff and hardware and software maintenance problems in the developing world.

## 2.7.2 Infrastructure

The digital divide between the rich and the poor has an impinging influence on the infrastructural development in poor countries. Africans don't have the needed infrastructure to use ICT. IT was a technologically intensive sector requiring a heavy investment in infrastructure, including power supply, transport and Internet connectivity. However, most developing countries have insufficient and widely disparate levels of infrastructure development. Most of the African nations are facing this problem. Rapid technological growth was another feature of the IT sector, and the poorer nations may not be able to afford the innovations available in the market. This makes the state of IT infrastructure more dated and often less efficient than the existing systems worldwide (Srivastava, 2007).

## 2.7.3 Lack of Expertise

Generally ICT experts are in short supply and one would not expect them to move from the urban to the rural. This has posed a serious challenge for the districts that use ICT. A study conducted came out that there was lack of continuity of National staff for managing the system (Lippeveld and Sapirie, 2000). A World Food Programme officer Srivastava who wrote an article on pitfalls, challenges of e-health in developing countries said that Lack of technically competent staff at all levels: IT was also a knowledge intensive industry and the application of IT tools require a basic level of technical competence among staff at all levels, ranging from top managers to the lowest field functionaries. However, an impressive base of such skilled human resource is not available in many of the developing nations, characterized by poor literacy levels. This was truer of sub-Saharan Africa. Also, the attrition rate of technically skilled persons was high and such

developing countries suffer from high levels of brain-drain as well. In the context of brain-drain in the IT sector, India deserves a special mention (Srivastava, 2007).

## 2.7.4 Financial Problems

Financial problems also came out as a challenge to the use of ICT. Most ICT projects are capital intensive which will not allow the districts to go into such a project. Lack of financial support and sustainability: With appreciably low health sector spending, poorer nations understandably do not have the same level of financial support to ICT in health as the richer nations. Several major innovative initiatives may die an unknown death for lack of fund support towards up scaling and mainstreaming. This was one of the key reasons why very few IT projects in the development sector prove to be financially sustainable in the long run (Srivastava, 2007). In East Asia for example, investment in ICTs for health was less advanced that might be expected, due to institutional, cultural and financial factors (Holiday and Tam, 2004). The financial factor was common to other regions: effective use of ICTs in health will need resourcing at a higher level than was currently the case. There was the need to find ways to blend private and public resource that contributed to the development of improved publicly accessible knowledge. The financial barriers to internet access are considerable, even just counting the costs of usage fees and telephone time which range from $100 (£66) to $1800 (£1200) annually and average about $704 (£469) in Africa. During their meeting in April in Cuba the Group of 77, the largest formal coalition of developing countries within the United Nations, asked that efforts be undertaken to ensure that their countries would not be left behind by the rapid development of the internet (British Medical Journal, 2000).

Planning and decision-making are intimately related managerial functions. Although these activities are often separated for instructional purposes, in practice they are effectively inseparable. The primary purpose of planning was to provide the guidelines necessary for decision-making and resulting actions throughout the organization. The health sector was said to be an information intensive sector which means that it depends on information flow before planning and subsequent decision was made.

However, data received for planning and decision-making sometimes do not help management decision making because, they are incomplete, inaccurate, untimely, obsolete and unrelated to the priority task and functions of the local personnel due to the challenges that has bedeviled the health sector (Lippeveld, 2000). According to (Lucey, 1997); the planning process was aimed at gathering, translating, understanding and communicating information that will help to improve decisions which are based on future expectation.

Most decisions in the health sector are not based on any information from the communities because those at the communities are unable to gather data on time to be submitted to the DHMT, however planning in the health sector is based on information generated from the previous year (Bloom, et al 1991). The national health office also depends on the information from the communities for decision making. So to ensure that the link between field practitioners, experts decision makers and other stakeholders are enhanced, then the health sector should utilize ICT for effective information flow. Wambura,(1998) argues that the regional or provincial and district health planners in many developing countries have not been able to analyse and interpret

such data for planning, allocating resources for respective health facilities and justifying the requests for resources needed.

Information and Communication Technologies (ICTs) are not only limited to the transfer of information, because ICT can be used to promote better health behavior, improve decision making, promote information exchange among peers, self care and enhances the effectiveness of health institutions.

According to (Kimambo, 2008), public health decision-making erotically depends on the timely availability of sound data. Reports indicate that, data flow to most health institutions does not flow on time. Most decisions take place before the information comes.
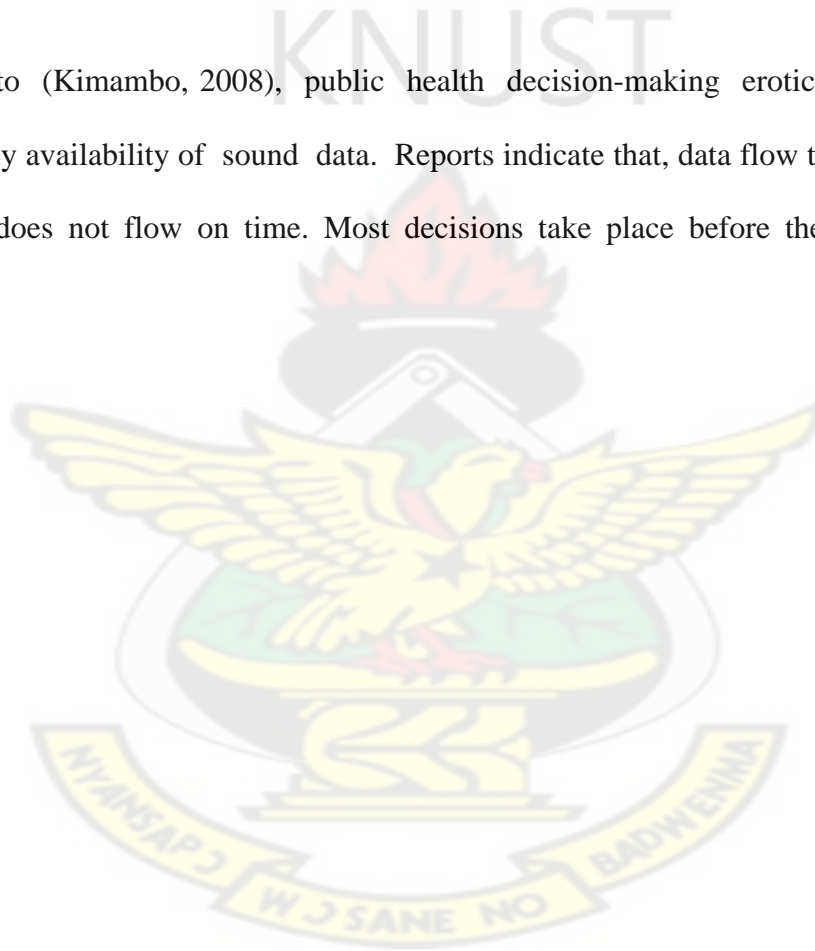
# CHAPTER THREE

## 3.0 Methodology

## 3.1 Study design

The design was descriptive cross-sectional which employed both quantitative and qualitative techniques to obtain information from respondents. The qualitative method included a key- informant interview and focused group discussion guide. The quantitative method used a questionnaire. Purposive sampling technique was used to sample a cross-section of the health workers for the study.

This chapter includes the variables studied, how the study was designed and carried out to obtain answers to study questions.

## 3.2 Data collection techniques/ tools

### 3.2.1 Qualitative study

A focus group discussion guide was developed to interview groups of health workers about the role of ICT in HIS in their operations. In all, five 5 FGDs were conducted which comprised five (5) different categories of health workers in a group. In a group they comprised of a nurse, biostatistician, medical record officer, dispensing technician and a laboratory technician. After the discussions, the views of the various health workers were transcribed. Three field assistants were in charge of the FGD, one moderating and the other two took down notes.

A key informant interview schedule was developed to get in–depth information about the real situation on the ground as far as the involvement of ICT in HIS was concerned. In

all, 11 health workers who use computers were interviewed. This was used to get an in-depth knowledge on how they saw the use computers to the manual format.

### 3.2.2 Quantitative study

In order to obtain the required information at the period of the study, the investigator prepared a self- administered questionnaire that was given to health facility workers. A total of 60 respondents were purposively sampled from the health workers within the district. The quantitative component focused on background variable, security of data, modes of storage and analyses, challenges of ICT among other things.

### 3.3 Study population

The study population involved all health workers in the various sub-districts and institutions at the ASD under MOH who keep health information. Other private institutions who also submit information to the health sector were also targeted.

### 3.4 Study variables

The study looked at storage, accessibility, feedback, security, analysis, importance of ICT and challenges and how it could affect planning and decision making.

Table 4 Study variables

| VARIABLE | OPERATIONAL DEFINITION | SCALE OF MEASUREMENT | OBJECTIVE(S) ADDRESSED |
|---|---|---|---|
| 1. Storage | Methods used in Storing Information | Binary | |
| | | Manual | Objective 1 |
| | | Computer | |
| 2.Accessibility | Difficulty accessing information | Binary | |
| | | Difficult | Objective 2 |
| | | Not difficult | |
| 3. Feedback | Response to information received from source | Binary | Objective 3 |
| | | Yes | |
| | | No | |
| 4. Secured | How classified are some information | Ordinal | |
| | | Very Good | Objective 4 |
| | | Good | |
| | | Poor | |
| 5.Analyzing data | Data converted into summary figures | Nominal | |
| | | Percentages | Objective 5 |
| | | Ratio | |
| | | Proportions | |
| 6. Importance of ICT | How important health workers see ICT | Ordinal | Objective 6 |
| | | Very Good | |
| | | Good | |
| | | Poor | |
| 7. challenges to ICT | What are the problems preventing you from utilizing ICT | Nominal | Objective 7 |
| | | Personnel | |
| | | Finance | |
| | | Infrastructure | |
| | | All the above | |
| 8. Planning and decision making | The effect of the challenges on decision making | Ordinal | |
| | | Very Good | |
| | | Good | |
| | | Poor | Objective 7 |

36

## 3.5 Sample size

The sample size was 60 which was a census of health workers from the districts, sub-district and other health institutions whether private or public so far as they sent information to the district health directorate. At the time of the study the Afigya Sekyere district had been redemarcated hence the small sample size above.

The respondents included the members of the District Health Management Team (DHMT), those in charge of health facilities, members of Sub-District Health Teams (SDHT), Traditional Birth Attendants (TBA); Community base surveillance volunteers (CBSV) and National Health Insurance Scheme (NHIS).

Purposive sampling was used to select study subjects. This was a deliberate choice of health manager / administrators and those who handle various reporting forms. This sampling method was also used because the researcher wanted to have an in depth investigation with the purpose to gain a deeper understanding of the role of ICT in HIS in the Afigya Sekyere district. In general, purposive sampling's basis for selecting respondents may not allow for generalization. Despite its obvious limitations, it does not mean that purposive/judgmental assessment should never be used in assessing the impact of a programme (Rossi et al, 1993)

## 3.6 Pre-testing

The questionnaire was pre-tested in the Kwabre district in the Ashanti region which has almost the same characteristics as Afigya Sekyere district. This was done to ensure questionnaire validity and reliability. After the pre-testing some corrections were made to ensure that the questionnaire was devoid of possible bias. A final questionnaire was produced.

## 3.7 Ethical consideration

For the purpose of the study permission was sought from the, DCE, DHMT, medical superintendents and those who head various health facilities. Health workers were written to inform them about the study and their involvement.

## 3.8 Data analysis

The researcher was sure that data collected were complete and accurate by checking through the questionnaires after each days field work. The data collected on each day was summarized manually, compiling responses to similar numerical values as appeared on a separate questionnaire. Responses to open ended questions were categorized and quantified and later entered onto the computer master sheets with tables created. Data was analyzed by using the Statistical Package for Social Sciences (SPSS version 16).

## 3.9 Limitation of the study

The limitation due to purposive sampling used in selecting respondents could leave out some people who could have given a better insight on the topic. This to a large extent could limit the generalization of the results.

Respondent bias: Time was not on the side of the researcher to cross-check all completed questionnaires to find out whether the respondents answered in favour of the researcher.

Time constraint on the part of the respondents was a limitation. This was due to the fact that most respondents were on outreach and health education programmes.

## 3.10 Assumptions

(1)    It was assumed that the 60 sample size selected coupled with other tools like focus group discussions and key informant interview were a true reflection of the health workers within the district since the total staff was a little above 100 at the time of the study.

(2)    It was also assumed that all information given was the true fact.

(3)    Above all it was assumed that the respondent's biases and time constraints will not significantly affect the study.

# CHAPTER FOUR

## 4.0 Results

## 4.1 Background variables

On the age of the respondents, a small number of respondents 16.7% fell between the ages 20-29 years, 14 respondents representing 23.3% fell within ages 30-39 years, 23 workers making 38% fell between ages 40-49, and 13 workers representing21.7% are also between ages 50-60years.

**Table 5 Background variables**

| Age | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| **20 - 29** | 10 | 16.7 | 16.7 | **16.7** |
| **30 - 39** | 14 | 23.3 | 23.3 | **40.0** |
| **40 – 49** | 23 | 38.3 | 38.3 | **78. 3** |
| **50 - 60** | 13 | 21.7 | 21.7 | **100.0** |
| Total | **60** | **100.0** | **100.0** | |

Source: field survey, 2008

**Table 6 Educational background**

| Educational level | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| GCE/O/A/Level | 8 | 13.3 | 13.3 | 45.0 |
| MSLS | 27 | 45.0 | 45.0 | 90.0 |
| No response | 6 | 10.0 | 10.0 | 100.0 |
| Total | 60 | 100.0 | 100.00 | |

Source: field survey, 2008

Again  table 4.1 above tells that of all the health workers interviewed 5 respondent representing 8.3% went to tertiary institution(full degree), 14 respondents representing 23.3% went to school up to diploma level while 27 respondents representing 45.0% went to MSLC, 8 respondent representing 13.3% had their GCE O/A levels. Only six respondents representing 10.0% failed to respond to the question.

## 4.2 Storing data

More than half (56.7%) of the health workers said they stored data manually, 18(30.0%) respondents said they stored data on a computer, 3 respondents representing 5.0% said they use other mode. Also 5 respondents representing 8.3% did not answer.

**Table 7 Modes of storing data**

| modes | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| **Manual** | 34 | 56.7 | 56.7 | 56.7 |
| **Computer** | 18 | 30.0 | 30.0 | 86.7 |
| **Others** | 3 | 5.0 | 5.0 | 91.7 |
| **No response** | 5 | 8.3 | 8.3 | 100.0 |
| **Total** | 60 | 100.0 | 100.0 | |

Source: field survey, 2008

FGD: The focus group discussion groups gave computers and manual as their mode of storing health information, however most of the respondents said the manual one was mostly used.

KII: Most of the respondents said they use manual format. A small number of the managers store data on computers.

## 4.3 Accessing health information

On the ease of accessing HI when needed, majority (58.3%) of the respondents said they found it difficult to access information, while 25(41.7%) said accessing information in the district was easy.

**Table 8 Accessing Health information**

| Difficulty accessing data | Frequency | Percent | Valid percent | Cumulative percent |
|---|---|---|---|---|
| **Difficult** | 35 | 58.3 | 58.3 | **58.3** |
| **Easy** | 25 | 41.7 | 41.7 | **100.0** |
| Total | **60** | **100.0** | **100.0** | **100.0** |

Source: field survey, 2008

FGD: The mode of accessing HIS were of two folds one through shelve and archives and the other through computer. But prominent among the mode were searching through archives and shelves. The mode of accessing HIS was said to be very difficult since one would have to go through so many files and archives before getting information in the office. It was also difficult to access information on the internet

KII: Respondents gave varied ways of accessing health information. Some accessed through the shelve archives and computer. However, more than half of respondents agreed that information was not readily available for use.

## 4.4 Feedback on information sent

On whether they got feedback after they have disseminated information 17 respondents representing 36.7% said they received feedback on information they submit, while 26 respondents representing 53.1% said they did not receive any feedback. Also 5 respondents representing 10.2% did not answer the question at all.

FGD: Few members said they got feedback while majority said they don't.

KII: Some data collectors said they get-their feedback while others said they don't get. However majority don't get any feedback.

## 4.5 Security of health data

On security of health information more than half (56.7%) of the respondents said security of the data was good, 21 respondents representing 35.0% indicated that their data was not secured, whilst 5 (8.3%) did not respond at all.

**Table 9 Security of Health data**

| Security of data | Frequency | Percent | Valid Percent | Cumulative percent |
|---|---|---|---|---|
| **Yes** | 34 | 56.7 | 56.7 | **56.7** |
| **No** | 21 | 35.0 | 35.0 | **91.7** |
| **No response** | 5 | 8.3 | 8.3 | **100.0** |
| Total | **60** | **100.0** | **100.0** | |

Source: field survey, 2008

When respondents were pressed to come out with the best way of securing data 46 respondents representing 76.7% said they preferred computer to manual. While 10 respondents representing 16.7% said they preferred manual suggesting that they are very much used to the manual way of saving data.

FGD: It came out that the general security of the HIS was very poor. Those who said it was secured used computers.

KII: The general agreement was that the security of HIS in the district was poor because of the paper documentation still in use.

## 4.6 Data analysis

More than half (53.3%) said they analyzed data before sending the data to their senior officers.  While 22 (36.7%) respondents said they sent data in its raw state.  However, 6 respondents did not answer the question at all.

## Table 10 Data Analysis

| Data analysis | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Analyse | 32 | 53.3 | 53.3 | 53.3 |
| Don't analyse | 22 | 36.7 | 36.7 | 90.00 |
| No response | 6 | 10.0 | 10.0 | 100.00 |
| Total | 60 | 100.0 | 100.0 | |

Source: field survey, 2008

On whether they analyse data, more than half 53.3% analysed data. Only 22(36.7%) of the respondents indicated that they do not analyse data. Also 6 (10%) did not respond.

FGD: It was discovered that most health workers analysed data before sending them to the DHMT, whereas some do not analyse data.

KII: Data was analyzed at the facility level by some health workers whilst others send data raw. However manual format of analysis featured prominently.

## 4.7 Importance of ICT to the health worker

When asked to find out whether ICT could enhance HIS, 33 respondents representing 55.0% said yes ICT could enhance HIS while 17 respondents representing 28.0% said they did not think that ICT can enhance HIS.  10(17.0) respondents did not answer that question.

When asked to state why they felt that ICT could enhance HIS 26 respondents representing 43.3% said the use of computer give accuracy to data, 20 (33.3%) respondents said it is good to store data on computer.  While 5 (8.3%) respondents said it makes data to be easily accessed and 1 (1.7%) respondent said it makes it work faster respectively.

FGD: *Almost all respondents said the use of ICT in HIS will be very helpful to their work.*

KII: *Others don't fear but believe that ICT came to empower them. Majority of the respondents said ICT could improve HIS.*

## 4.8 Challenges of ICT and its effect on planning and decision making in the district.

Less than half (35.0%) of the respondents said they have been trained to use computers while 32 (53.3%) respondents said they have not been trained. Again 7 respondent representing 11.7% did not respond.

When asked whether they have the infrastructure like buildings and equipments 22 respondents representing 37.0% indicated that they have the infrastructure, 33(55.0%) said they do not have the infrastructure. On expertise, 24 respondents making 40.0% said they have the expertise while 28(46.7%) said they do not have the expertise.

**Table 11 Challenges of ICT and its effect on planning and decision making in district**

| All health workers trained | Frequency | Percent | Valid Percent | Cumulative Percent |
|:---:|:---:|:---:|:---:|:---:|
| Yes | 21 | 35.0 | 35.0 | 35.0 |
| No | 32 | 53.3 | 53.3 | 88.0 |
| No response | 7 | 11.7 | 11.7 | 100.0 |
| Total | 60 | 100.00 | | |

Source: field survey 2008

Another challenge was on finance, with this 22(36.7%) said they have the finance while 23(38.3%) said the district don't have the finance.

When asked again whether these challenges can affect the decision making 22 representing 36.7% said it delays decision making and 33 respondents representing 55.0% indicated that they got so many inaccuracies because of the manual way of doing things in the districts as the table above depicts

FGD: *The challenges that were mentioned were many, but these were identified to be the major ones; lack of skilled personnel, infrastructure, finance and untrained staff featured prominently. It was agreed that these challenges could affect planning and decision making. Among the factor that were said to have affected decision making for failing to use ICT were delays and inaccuracies of data because of the manual method of doing things.*

KII: *The challenges were not different from what was discovered in both the interview and the FGD. They were finance, infrastructure, and lack of personal and their inability to train workers. Numerous reasons were given however delay in decision making and in accuracies of data stood tall. Numerous reasons were given, however, delay in decision making and in accuracies of data stood tall.*

# CHAPTER FIVE

## 5.0 Discussion

## 5.1 Background Characteristics of Respondents

### 5.1.1 Educational level of respondents

Almost (45%) of the respondents held middle school living certificates (MSLC). The experience of those MSLC workers who formed the majority cannot be underestimated. However, they used their old method of treating patient whereas new technology might have come to reduce their workload. This could be attributed to the reasons why some respondents failed to respond to certain questions. Also only 8.3% have completed tertiary. This could mean that the level of education of the health worker was very low in the district.

### 5.1.2 Age of respondents

The ages of the respondents were evenly distributed. However majority of the respondents fell between the ages of 40-49. The age distribution showed why majority of respondents opted for the computerization of the health sector. This was because they fell within the active working group and they were eager to learn.

## 5.2 Modes of storing data

The mode of storage would determine whether it can lead to delay in discharging their duties which would eventually lead to delay in taking decision. From the results 56.7% of the respondents indicated that they stored data manually while 30% stored data in computers, 5.0% uses other modes and 8.3% did not respond .This agreed with a study which was conducted by Garrib, et al which confirmed that majority of South Africans still store health data manually (Garrib, et al 2007). The manual format again manifested itself when WHO assessed the Cambodian HIS, the results clearly showed the

cumbersome nature their health information went through before processing. The use of technology for the NHIS was still limited. No computers were available at health centers and no plans existed currently to use ICT because majority of health centers don't have electricity. At the health center, the chief of health center manually collects data from all registers (Out-patient consultations, in-patient discharge for form district hospital, antenatal and post-natal cares, birth spacing, birth delivery, vaccination, vitamin A program, deworming activities, dental activities, leprosy, and lab results for malaria), and compile a paper form for monthly report then sends it to the operational district office (Veasnakiry and Sovanratnak, 2007)

Another mode of storing data was digital storage, because 30% of the respondents said they stored data digitally and studies conducted in Kenya and Uganda confirmed that some health personnel stored data digitally (International Development Research centre, 2009). In a WHO's assessment of Belizean health information it was confirmed that Belize had gone digital, they now have a system that allows data to be made available to authorized users anywhere in the country almost as soon as they are entered in the system. Benefits included the use of alerts and reminders to decision-makers connected to the system, a greater ability to track and monitor infectious disease outbreaks, and country-wide support for such programmes as the prevention of mother-to-child transmission of HIV (WHO, 2009). All those who stored data digitally work in the district capital and this brings about the issue of digital divide, digitizing the health sector was based on ability to make use of ICT this have been confirmed in an article by Mutume, G, Africa has the fewest telephone lines, radios, television sets, computers and Internet users of any part of the world. These tools, used to package and transmit information and knowledge, are broadly referred to as information and communications

technologies (ICTs). The gap between those with access to ICTs and those without is generally referred to as the "digital divide." It was most extreme in Africa, where in 2001, out of 800 million people, only 1 in 4 had a radio, 1 in 13 a television set, 1 in 40 a telephone and 1 out of 130 a computer. The divide widens in Africa's countryside, where a lack of roads, telephone lines and electricity separates the rural majority from their urban counterparts (Mutume, 2003).

## 5.3 Accessing health information

Accessing health information should be in a simplest mode. However accessing health information in most developing countries was very difficult. Available results from the field indicated that 58.3% of the health workers in the ASD find it difficult accessing health information while 41.7% indicated that they do not find it difficult accessing health information. The results agreed with the available literature that asserted in a key paper produced as part of a global review on access to health information, Godlee et al (2004) concluded that 'Universal access to information for health professionals was a prerequisite for meeting the Millennium Development Goals and achieving Health for All. He went on to say that, despite the promises of the information revolution, and some successful initiatives, there was little if any evidence that the majority of health professionals in the developing world are any better informed than they were 10 years ago. Lack of access to information remains a major barrier to knowledge-based health care in developing countries' (as well as in many parts of the 'developed' (Godlee et al., 2004). Another study conducted in Zambia also agreed with the results that, accessing health information was very difficult to come by in developing countries (Health Information and Libraries Journal,, 2007).In a World Bank report it was again estimated that 100000 deaths could have been avoided each year if reproductive health information

like family planning were accessible to women who said they wanted no more children were able to prevent future pregnancies (World Bank, 1993). Also in a study by Shane that looked at improving reproductive health in developing countries it was estimated that 50 million induce abortions are performed each year, with some 20 million of these performed in unsafe circumstances or by untrained providers. All these are as a result of lack of access to a range of contraceptives choices as well as high quality information and services (Shane, 1997). Also key informant interview, focus group discussion and personal observation supported the general view that, there were difficulties accessing health information.

## 5.4 Feedback

Giving feedback was to let a person know his or her performance. This could even motivate the workers to always work hard. This will allow them to know how they were faring. However, on the ground all the data collection tools gave a different picture which sought to suggest that, health managers always find it difficult to reply on each receipt of information. The results showed that 53.1% of the respondents said they do not receive feedback while 36.7% of the respondents said they receive any feedback, also, 10.2% did not respond. This agreed with (Garrib, et al 2008) who after evaluating South African health information concluded that majority of South African health workers do not get feedback on the returns they send to the headquarters. Also according to( Dubow, 2006) on Improving health, connecting people: the role of ICTs in the health sector of developing countries, supported that, all participants must get out of an information system at least as much as they put in it must generate benefits greater than its own cost, otherwise the system becomes a burden. Information systems are almost totally dependent upon the staff that provide and record the information, yet these are usually the

lowest valued and least involved. If there are no benefits evident to them for the contributions they make, there is a high probability of building inaccuracy, instability, and future failure (Dubow, 2006)

On whether it was important to receive feedback majority of the respondents indicated that it was very important. While a sizeable number said it was not important. Probably those who are not interested in feedback might have been refused feedback for a very long time and have become used to it. Those who said it was important agreed with (Lucey, 1997) who said that health data providers become satisfied when they realized that their data were used to solve problems. Feedback was an important tool that can be used to encourage health data collectors to give voluntary reports.

## 5.5 Security of health data

One of the main idea of which the research was conducted was to find out how health information was secured. The security of health information was of prime importance to the health sector. Though 56.7% of the health workers said data security was good in the district; however one cannot put away the assertion by the 35.0% who said that their data was not secured and 8.3% did not respond. Any confidential data that comes out to the public was a very serious consequence to the health sector. Though the situation on the ground gives a contrary view of what (National Academies Press, 2001) said that the current situation of paper documentation makes consumers and policy makers share concern about the privacy and confidentiality of health data. In a study to assess the national health information system in developing countries WHO emphasized that, though there was the need to access to health information, there was also the need to have a means of securing and protecting the information assets of the system. For example, a

system may contain disaggregated patient information affected by privacy and security considerations. It was therefore essential to control access to confidential information (WHO, 2008). However the key informant interview, focus group discussion and personal observation supported the literature that data security was poor.

## 5.6 Analysing data

A data was not useful when it was not analysed to bring meanings to it. The results from the self administered, questionnaire, focus group discussions, key informant interview, and personal observation indicated that 53.3% respondents in the ASD analyse their data, whereas 36.7% of the respondents said they do not analyse data also 10.0% did not respond. The most important part of analysis was to estimate coverage for services offered. However studies that evaluated the South African health information system showed that most health facilities send data in their raw form in South Africa (Garrib, et al., 2008).The modes in which they analyse data result in delays in sending health information. This was because of majority of the health workers use manual format. It was the view of Savigny and Binka who monitored the future impact on malaria burden in sub-Saharan Africa that although data are the raw materials of the national HIS, they have little intrinsic value in themselves. Only after data have been compiled, managed and analysed do they produce information. Information was of far greater value, especially when it was integrated with other information and evaluated in terms of the issues confronting the health system. At this stage, information becomes evidence that can be used by decision-makers (Savigny and Binka, 2004). Also complimenting the discussions above (Darko et al., 1996) asserted that data must be summarized and partly analysed at the facility, district and regional before reaching the GHS. The rest of those who do not analyse their data failed to agree with the literature which suggested that data

should be analysed at the facility level before sending. And of those health workers who collect data and analyse by manual format (Robinson, 2006) have said that the application of ICT should be used to help workers analyse data before sending them, because the analysis of data will help provide evidence to more health professionals and administrators from opinion based decision making to evidence based decision making.

## 5.7 Importance of ICT in HIS

The surest way to improve on HIS was to adopt ICT, when asked, whether ICT can enhance health data 55.0% of the respondents said yes 28% do not think that ICT could have any impact in HIS again 17% failed to respond. According to WHO (2004) HIS forms the backbone of the services to prevent, diagnose, treat illness and disease. ICTs are only one category of the vast array of technologies that may be of use. Nevertheless, the role of ICT in modernizing the Health Sector was undeniable (Daly, 2003). Again several studies have also confirmed the immense contribution of ICT to HIS integrating the use of ICTs into existing health systems has helped to improve the delivery of health care in a number of ways (Rodriguez, 2000a, 2000b; Pan American Health Organization, 2001). These include:

• The use of telemedicine to improve diagnosis and enhance patient care

• Improvements in the continuing professional development of health workers and better sharing of research findings

• Efforts to extend the reach and coverage of health care to make an impact on specific conditions. Many of these given the right policies, organization, resources and institutions, ICTs can be powerful tools in the hands of those working to improve health (Daly, 2003). The importance of ICT came out clear in a study done by (Ahmed, 2004) in

Bangladesh on different level of scale was developed to register, schedule and track immunization of children a computerised system was introduced to replace a manual record keeping system .Over a period of three years, the new system was able to increase immunization rates from around 40% to over 80%. A critical element of the success of this intervention was that, it was designed to meet the interests and needs and provide tangible benefits to a number of different stakeholders .It reduced the time health workers spent searching records; it made it easier for managerial staff to supervise the immunization system and monitor performance; it improved immunization protection for children and ultimately their health, a positive benefit for the families reached by the system (Ahmed, 2004).

When they were pressed to give reasons most of the respondents said it could create easy storage whereas others said it saved time and gave accurate information. Olusesan also shared the same view by stating that ICT plays a major role by ensuring that it eliminated loss files; create effective communication between medical personnel, and reduced storage space and easy transmission of data from the facility through to the policy maker (Makinde, 2008).

ICT creates an enabling field for the health workers to enhance HIS. However 28% of the respondents still believe that ICT cannot enhance HIS. Wilson supported this by giving a warning that "it was important to ensure that, computerization of health information systems does not dominate the health information system reform improvement process" (Wilson, 2000). This was because the majority of health information users in developing countries have no access to computer technology, thus the development and improvement of manual systems for collection, analysis, and use of data should be the primary focus.

However the key informant interview and focus group discussion gave a total support for the computerization of the health sector since it can enhance HIS.

## 5.8 Challenges of ICT and its effect on planning and decision making in the district.

In all human endeavours there are challenges that people face. These challenges are there to be broken and a breakthrough found. Those people who fear for any eminent challenges cannot go far. Implementation of ICT project was another area that was bedeviled with so many challenges in the rural areas of Ghana, particularly in ASD. Some of the challenges found were inadequate expertise of which 46.7% of the respondents said they do not have the expertise, this agreed with available literature which said that, an impressive base of such skilled human resource was not available in many of the developing nations, characterized by poor literacy levels. This was truer of sub-Saharan Africa. Also, the attrition rate of technically skilled persons was high and such developing countries suffer from high levels of brain-drain as well. In the context of brain-drain in the IT sector, India deserves a special mention (Srivastava, 2007).

On infrastructure 55.0% of the respondents revealed that they lack the infrastructure, most developing countries have insufficient and widely disparate levels of infrastructure development. Most of the African nations are facing this problem. Rapid technological growth was another feature of the IT sector, and the poorer nations may not be able to afford the innovations available in the market. This makes the state of IT infrastructure more dated and often less efficient than the existing systems worldwide (Srivastava, 2007). Also 38.3% of the respondents said there was insufficient finance, available literature concluded that there was lack of financial support and sustainability: With appreciably low health sector spending, poorer nations understandably do not have the

same level of financial support to ICT in health as the richer nations. Several major innovative initiatives may die an unknown death for lack of fund support towards up scaling and mainstreaming. This was one of the key reasons why very few IT projects in the development sector prove to be financially sustainable in the long run (Srivastava, 2007)

The respondents indicated that 53% have not been trained. The challenges in the use ICT in developing countries are clear since it was a capital intensive venture. This have been supported by (Sandford, 1992, and Srivastava, 2007) who stated that lack of expertise, untrained staff, lack of infrastructure and finance are some of the challenges preventing the developing world from using ICT. The utilization of ICT in the health sector must be taken with boldness since it was capital intensive venture. From the results most of the health workers said that they have not trained their staff, also majority of health workers said they have not been trained whereas a sizeable number have been trained.

Results from the key informant interview, and the focus group discussion also gave the same challenges as stipulated in the results from the self administered questionnaire. As to whether these challenges could affect planning and decision making or not (Allotey, 2000). Browne et al (1999) stated that there was little transformation to support decision making because data collected are poor because of health sectors inability to train staff in the area of ICT. Others are of the belief that the district has the capacity to implement ICT despite those challenges.

How fast decision was taken depended on the information received. Whenever information delayed it affected decision making. So there was the need to always adopt an effective way of disseminating health information for informed decision to be taken.

Almost 100% the respondents including the key informant interview and the focus group discussion said that the challenges of ICT affects decision making. A sizeable number of the respondents also indicated that it does not affect them. According to (Bloom et al., 1991,) planning begins with the assessment of the previous year's performance by heads of facilities and departments. They, therefore, require information on the health status, service provision and resource. So, if these challenges prevent the flow of that vital information it will definitely affect planning and decision making. Health sector should permit the generation of information allowing rational decision making at each level of the health service from the peripheral. Wambura (1998) argues that the regional or provincial and district health planners in many developing countries have not been able to analyse and interpret such data for planning, allocating resources for respective health facilities and justifying the requests for resources needed.

# CHAPTER SIX

## 6.0 Conclusions and Recommendations

### 6.1 Conclusions

### Storage

Evidently, the ASD was exposed to both modes of storing data since 56.7% of the health staff still store data traditionally (manual) and only 30.0% store data on computers, this shows that there was a minimal use of ICT in the district . However, most health workers preferred digital storage to the manual.

### Accessing health information

There was a general difficulty in accessing health information in the ASD. This was evident from the results where 58.3% indicated that they find it difficult searching for HI. The minimal use of ICT has made it difficult for them to access HI.

### Feedback

Sending feedback was a problem; 53.1% did not send feedback to health workers who gathered data in the ASD. Both focus group discussion and the key informant interviewed also revealed that feedback was not sent. The power of ICT to be able to give instant feedback was missing.

### Security of health data

Though only 30.0% of health personnel used computers, 56.7% health workers believed that security of data was good in the ASD. However, both focused group discussion and the key informant interviewed came out that security of HIS was poor due to minimal use of ICT. Majority still believed that the best way to secure data was by the use of computers. It was evident that lack of computers has given way to data insecurity.

**Analysing health data**

Some data were analysed; 53.3% health workers analysed data before sending them. However, only 36.7% did not analyse data. Also both focus group discussion and the key informant interviewed confirm that majority analyse data before sending them. The analysis was done manually because they do not have the computers to do reliable analysis.

**Importance of ICT to the health worker**

ICT could be a catalyst to enhance HIS; 55.0% saw ICT to be a catalyst to enhance health information system, thereby bringing good health care delivery to the people. However, others still exhibited some bad sentiments about the success of ICT in the HIS in the district.

**Challenges of ICT and its effect on planning and decision making in the district**

It was evident that there were a lot of challenges but the notable ones mentioned, indicated that 53.3% lacked training whereas 55.0% revealed that they lacked infrastructure. On expertise 46.7% believed that they do not have the expertise and 38.3% declared lack of finance. The 55.5% agreed that these challenges are affecting planning and decision making. These challenges have made the utilization of ICT in HIS in he district very minimal.

# 6.2 Recommendations

## Community

The ASD community should be educated by the DHMT to appreciate the essence of computerizing the health sector. The community is the producer's of health and as such during annual performance review meetings and durbars, the community should be invited to brainstorm with the DHMT on things they could do to enhance health care delivery system in the district. Also on such platforms, the DHMT can request from the community, to support either in cash or in kind. This will allow the community to make available lands, equipments and buildings to support the infrastructural needs of the sector to enable the ASD to use ICT. The situation where there is a clear gap between health providers and health producers should be a thing of the past. When the community is made to participate in health issues, both can help solve health information problems.

## District assembly

To ensure effective health care delivery, HIS should be easily accessed. However ASD lack basic telecommunication infrastructure like buildings and equipments, therefore the district assembly needs to put the necessary infrastructures in place for the DHMT to use ICT in the district. This could bring about effective dissemination and access to health information through the use of internet.

## Ministry of Health/ Ghana Health Service

The ministry of health should be able to fashion out draft policies on ICT in the health sector to government for consideration. This will help address the problems of expertise, infrastructure (buildings and equipments) and finance that have thwarted the effort of ensuring effective ICT use in the district. Also the ministry should periodically train or retrain their workers on the new ways of ICT use, because there was a sub district that

had a computer, but, do not have the needed knowledge to use it. Inter-sectoral collaboration should be encouraged between ministries and districts, so that nearby districts could pull resources together to get one satellite which may be expensive for one district, to serve them instead of one district or ministry waiting for years to get that same satellite. The ministry's effort will help streamline all the rough edges in the health sector as far as health information is concerned

**Non- Governmental Organizations (NGOs)**

The district health administration can solicit help from non-governmental agencies to organize training workshops for those who have the computers. Another area of help from the NGOs could be the donation of computers to the DHMT. Also wireless satellites could be provided to enhance the accessibility and use of data if DHMT solicit help from the NGOs. This will help the DHMT get things they cannot afford.

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## APPENDIX A

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**COLLEGE OF HEALTH SCIENCE SCHOOL OF MEDICAL SCHOOL**

**DEPARTMENT OF COMMUNITY HEALTH**

This research is for academic purposes whereby the findings will be presented at the faculty of medical school, Kwame Nkrumah University of Science and Technology.

There are no right and wrong answers. All information will be strictly confidential, please feel free to respond these questions.

**LIST OF DATA COLLECTION TOOLS**

1. INTERVIEW

2. QUESTIONNAIRE

**A RESEARCH QUESTIONNAIRE ON THE ROLE OF INFORMATION COMMUNICATION AND TECHNOLOGY IN HEALTH INFORMATION SYSTEM.**

**QUESTIONNAIRE FOR HEALTH MANAGERS**

GENERAL INFROAMTION:

1. Date of interview ………………………

2. District …………………………………

3. Sub-district ……………………………….

4. Age of respondents ………………………………………..

5. Community ……………………………..

6. Respondents position………………………………

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7.    Educational background………………………….

8.    How do you value HIS………………………

PLANNING AND DECSION MAKING

9.    How many people constitute?  DHMT   [  ]  SDHMT   [  ]  CHPS   [  ]

10.   Do you meet regularly     Yes [    ]                  No [    ]

11.   If yes, how often…………………………………………………….

12.   If No, why don't you meet…………………………………………

13.   Do you plan your activities………………………………………….

14.   If Yes, who plans it…………………………………………………

15.   If No, why don't you plan your activities………………..…………

      ANALYSIS

16.   Do you analyze your data?   Yes [   ]    No [   ]

17.   If Yes, how do you analyze your data   Computer   [  ]   Manual   [   ]

18.   If No, why don't you analyze your data?

19.   Where do you get your information to take decision

20.   Do you always get all expected information before taking decision?

21.   How do you get the Information? Please tick where appropriate

      Internet [    ] Fax [ ] Telephone [ ] Transport [ ] Others (Specify)…………

      STORAGE

22.   Do you think that ICT can enhance planning and decision making in the

      district? YES   [   ]        NO   [   ]

23    How do you store data?

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24.     Are you contend with the mode of storing and disseminating health information in the district YES [ ]    NO  [ ]

        ACCESSIBILITY

25.     Do you find it difficult accessing Information from those who are supposed to give you that information?  YES [   ]  NO    [   ]

26.     Give reasons to any of answers you select in question 25?

27.     Do you get all the information when you need them? YES [  ]   NO  [  ]

28.     How long does it take you to get information?

        Hours [  ] Days [  ] Weekly [  ] Monthly [   ] Others (Specify)……………….

29.     How do you think ICT can help you search for HI?

**INFORMATION COMMUNICATION TECHNOLOGY**

30.     How many computers do you have in the office?

31.     What do you use them for?

32.     Are the computers linked up with the rest of the computers in the district through any form of internet? YES   [    ]  NO  [    ]

33.     If YES how does the computer help you in your activities?

34.     If NO how do you link up with the rest of the people who are supposed to give you information?

35.     Do you think that failure to use ICT in HIS can affect decision making

36.     How will ICT improve data collection, timely and dissemination of HI in your district?

37.     Can you explain the importance of ICT in HIS?

**CHALLENGES**

38.     Have you trained those who handle ICT? Yes    [ ]     No   [ ]

39.    Do you have the expertise to work with?  Yes    [  ]       No    [  ]

40.    Can your financial status help you to use ICT? Yes    [  ] No    [  ]

41.    Do you have the basic infrastructure to use ICT? Yes [  ] No    [  ]

       Do you think that these challenges could affect planning and decision making?

42.    Is where you keep data secure?  Yes [   ] No [   ]

43     Which of these modes would you prefer for the security of your data?

       Computer [   ]   Manual    [  ]

44.    What would you recommend on the improvement of ICT in the health sector in

       the district?

## APPENDIX B
**QUESTIONAIRE FOR HEALTH PERSONNEL INVOLVED IN HEALTH**

**INFORMATION SYSTEM**

GENERAL INFORMATION

1. Date of Interview…………………………………………….

2. District…………………………………………………………….

3. Sub-district………………………………………………………

4. Age of respondent……………………………………………….

5. Community…………………………………………………………

6. Respondents………………………………………………………

7. Educational background………………………………………….

STORAGE

8. How do you store data? Manual    [   ]    Computer [   ] Others (Specify)…….

9. Do you encounter problems with the mode of storing data? YES    [   ]    NO.    [   ]

10. If YES to question 9 give reason………………………………….

ANALYSIS

11. What do you do with the information [data] when you have completed them?

   a. Analyze before disseminating   [   ]      b. Send them raw data   [   ]

12. If B is the answer why do you send the data raw data?

13. Do you know how to analyze data?

14. What Instrument do you used to analyze the information? Manual [   ] Computer [   ]

15. How much time do you spend in analyzing data and writing reports?

Hours   [   ]   Days [   ]   Others (Specify) …………….

16. Do the days or hours delay analysis? YES   [   ]   NO   [   ]

**SECURITY**

17. Where do you store data.  Manual   [   ]   Computer   [   ]

18. Is where the data stored secured?  Yes   [   ]   No   [   ]

19. If NO what will be the best mode of securing data collected. Manual [  ] Computer [

20. Can the mode of storage affect confidentiality of information you receive? No [ ] Yes

21. Give reason to answer given to question 29………………

**INFORMATION COMMUNICATION TECHNOLOGY**

22. How many computers do you have?     [     ]

23. Are the data you collect stored in the computers? YES [   ] NO   [   ]

24. Do you have internet or Satellite in your department?  YES   [   ]   NO   [   ]

25. Do you think that computer or internet software can help improve data processing and

    timely dissemination of information in your department?  Yes [ ]   No   [ ]

26. If YES how will it improve the data you collect.

27. How do you access the manual and the computer mode of storing information?

**CHALLENGES:**

28. Have you been trained to use computers?  YES [   ]   NO   [   ]

29. How can irregular flow of health information system affect decision making?

30. How can the problems of not using ICT affect your decision making?

31. Does the district have the expertise to use ICT?  YES   [   ]   NO   [   ]

32. Does the district have the finances to implement an effective ICT system? Yes[ ] No

33. Do you have the infrastructure for the usage of ICT?  YES   [   ]   NO   [   ]

**FEEDBACK**

34. Do you receive feedback on the returns you submit?   YES   [   ]      NO   [   ]

35. Do you think it is important to receive feedback on data submitted?  ………….

36. How do you send returns? Transport [ ] Motorbike [ ] Internet [ ] Others (Specify)

37. Do you have enough time to fill form?   YES   [   ] NO   [   ]

38. Is the work load too much for you?   YES [   ] NO   [ ]

39. Do you think that computers can reduce the work load?  YES   [   ]  NO [ ]

40. If yes how?  ………………………………………...………………….

ACCESSIBILITY

41. Do you find it difficult accessing Information from those who are     supposed to give

   you that information?   YES [    ]    NO   [    ]

42. What would you recommend on the improvement of ICT in the health?

   sector in the district?
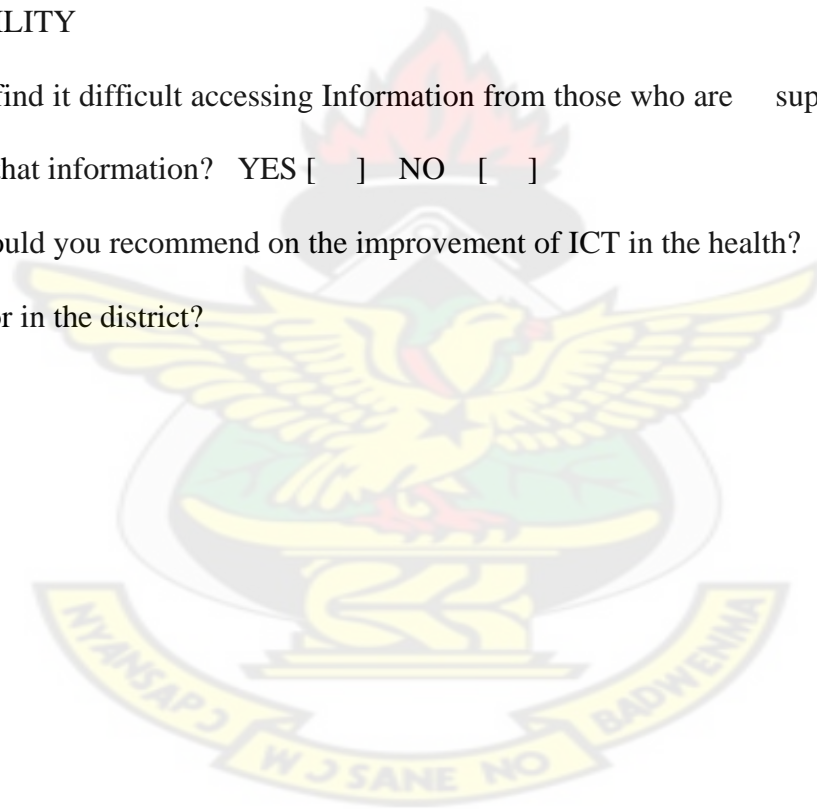
**APPENDIX C**
**KEY INFORMATION – INTERVIEW GUIDE**


**NAME OF INSTITUTION:**

**POSITION OF RESPONDENT:**


(1)     What has been the mode of storing information in your facility …?

(2)     How do you access information? ……………………………

(3)     Do you get feedback on information you send?   Yes [  ]☐  No [  ]☐

(4)     How do you ensure the security of your information?

(5)     What has been the means of analyzing data in the district?

(6)     Do you think that ICT can improve HIS?

(7)     What are the challenges associated with the introduction of ICT in HIS...

(8)     What effects are those challenges having on planning and decision making?

(9)     What recommendations would you make to DHMT on the need to

        improve ICT in the district? ……………………………………

## APPENDIX D
## FOCUS GROUP DISCUSSION GUIDE

**NAME OF GROUP**

**MEMBERSHIP**

**FOCUS/ROLE**

(1)     Have you been storing HI?     Yes [  ]        No. [  ]

(2)     If yes. What has been the mode of storing HI Computer and manual?

(3)     How do you access His in the district………………………………

(4)     Do you find it difficult accessing HIS?

(5)   Do you get feedback from the head office?

(6)   What form does it take? ...........................................................

(7)   Are the security of your information guaranteed?  Yes [  ] ☐No [  ]☐

(8)     How is it guaranteed?

(9)     Do you analyze data in the district?

(10)     Which ones are mostly used (list-based on frequency of usage?)

(11)     Do you see ICT in HIS as helpful?   Yes [   ] ☐    No [   ]☐

(12)     If yes How?

(13)     What are the challenges associated with the advent of ICT…………

(14)     What has been the impact of these challenges on planning and

           decision making?

(15)     What would be your recommendation when given the chance to

           advice the DHMT on the need to improve ICT in the district?

## APPENDIX E
**Transcript for focus group discussion**

**Mode of storing data**

*Nurse*: We use both modes of storing data and they are manual and digital. But majority of us mostly use manual format. However some of us in the district capital store data digitally.

*Dispensary technician*: What we have is the manual mode since it is the only way to store data.

*Record keepers:* We store data manually. We at the district capital have just started storing data digitally.

*Community nurses:* The manual and the digital modes are what we mostly used to store data.

*Laboratory technicians:* The manual and the computer format are the mode through which we store information.


**Accessing health information**


*Nurses***:** We find it difficult accessing health information. However the nurses from Asamang SDA hospital do not have any difficulty since they have internet facility available.

*Dispensary technicians:* Most at times I search and search but I do not get them.

*Record keepers:* There is duplication of records because if we do not see the records of a patient we issue a new card.

*Community nurses*: Documents are secured making it difficult to access them.

*Laboratory technicians:* Accessing health information is very difficult. In my hospital we do not find it difficult.

**Feedback**

**Nurses**: As for feedback we do not get after sending information.

*Dispensary technicians:* Receiving feedback is fluctuating. We *do not get it always.*

*Record keepers: We always send data but we do not get any feedback.*

*Community nurses:* Feedback is not something that we think about because you won't get it.

**Security of data**

*Nurses*: Even though we do not have computers, our data was secured.

We do not have confidential documents because any body at all can take a paper here and read what is on it. **A Nurse**

*Dispensary technician*: We do not have a secured data.

*Records keeper*:        The records we have here are not secured.

*Community nurses*: We try to keep data secured but it is not easy.

*Laboratory technician:* Because it a laboratory we try to keep data secured

**Data analysis**

*Nurses*: Sometimes we analyse data but other times we sent them raw.

*Dispensary technician*: Sometimes we analyse data and sometimes we do not.

*Record keepers*: We do not know how to analyse data.

*Laboratory technician*: it is analysed by the district biostatistician

**Importance of ICT to the health worker**

**Nurses**:  Those of us who have good perception about ICT do also know that it will enhance ICT.

*Dispensary technicians*: We perceive that the introduction of ICT in health will help store data and analyse health data. I believe that it can enhance ICT. I do not believe that ICT is the solution for HIS.

*Record keepers*: We do not believe that ICT can enhance HIS.

*Community nurses*: The use of ICT can make our work easy

**Challenges of ICT and its effect on planning and decision making**

**Nurses**: I think that the challenges are finance, infrastructural. The problems are many, like lack of expertise, finance, and irregular training of staff. Planning and decision making will be affected since the DHMT needs reliable information before taking a decision.

*Dispensary technician:*       I think that since we do not have the capital to implement ICT it will definitely affect planning and decision making.

*Record keepers***:**

- In this hospital I know we cannot use ICT unless it is made forms for free.

- No money, No experience ICT workers available.

- Yes, it will definitely affect planning and decision making because if ICT is not available we will continue to have inaccuracies.

*Laboratory technician***:**

- The challenges are such that it will be difficult to use ICT. The challenges are lack of infrastructure, expertise and finance.

- I think that we have the capacity to use ICT.

- The challenges are attitudinal, finance and equipments.

- All these challenges go a long way to affect planning and decision making.

# APPENDIX F

**TRANSCRIPT FOR KEY INFORMANT**

**Mode of storing data**

- I use computer but the rest of my staff stores data manually.

  **Biostatistician**

- Some use manual and others use computer. **District information officer**.

- Manual mode is what we have been using-**Medical assistant**

- We store data manually and sometimes digitally- **Disease control officer**

  **Accessing health information**

- It is a hell when you need some information **Biostatistician.**

- If it is difficult in the district capital, what about those in the sub districts.

  **District information officer**.

- It is very difficult but internally it is quite good. **Medical Assistant**

- Very difficult to retrieve information both in the district or from the outside

  **Disease control officer**


  **Feedback**

- Sometimes we get feedback **Biostatistician.**

- Do not even think about getting feedback. **District information officer**

- I do not get any feedback because since I started working here I have never

  received any feedback. **Medical Assistant**

- It is something rare in the district and at the regional level. **Disease control**

  **officer**

**Data security**

- Documents are not properly controlled **Biostatistician.**

- Data can easily be read by anybody **District information officer**

- Security of data is too bad in the district **Medical Assistant**

- Health information is stored any how allowing any person to get hold of them.

  **Disease control officer**

**Data analysis**

- More than half of the workers do not know how to analyze data. However it is manually done whenever it is analyzed. **Biostatistician.**

- Analysis is done digitally **District information officer**

- There is no one in my department who knows how to analyse data. **Medical Assistant**

- I do not analyse data **Disease control officer**

**Importance of ICT to the health worker**

- ICT is a good thing that can help us do something fast and accurate. **Biostatistician.**

- I do not think that ICT can enhance HIS. **District information officer**

- I think that the use of ICT is a good thing. **Medical Assistant**

- The best way to enhance HIS is to use ICT. **Disease control officer**

**Challenges of ICT and its effect on planning and decision making**

- Infrastructure, technology and Expertise **Biostatistician.**

- The challenging of the introduction of ICT is lack of expertise, untrained staff. **District information officer**

- Financial problem and infrastructure are problems associated with the ICT introduction. **Medical Assistant**

- Untrained staff, infrastructure, lack of funds and attitude of health workers. **Disease control officer**

- If we do not have ICT due to the problem of its introduction, it will definitely affect planning and decision making. **Biostatistician.**


- Failure to use ICT well could create inaccuracies in data and that will delay in taking decision. **District information officer**

- Yes it will affect planning and decision making. **Medical Assistant**

- Without ICT we will not be able to access information, delay in sending and receiving data. **Disease control officer**
  **Recommendations**

- The government should come out with policy that will ensure the full computerization of the health sector. The community should not be   sidelined. **Biostatistician.**

- Non- governmental agencies should be contacted to give computers and the training of expertise. **District information officer**

- The district assembly should be approached to provide infrastructure for a smooth take off of the ICT. **Medical Assistant**

- I believe that the communities, government, NGOs and the district assembly all have a role play to ensure good health care delivery. **Disease control officer**